

17 JUN 2005

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/SE 03/02009

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**Box No. 1 Basis of the report**

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1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the elements\* of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

**Description, Pages**

1-6 as originally filed

**Claims, Numbers**

1-9 as originally filed

**Drawings, Sheets**

1/1 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (specify):
  - ☐ any table(s) related to sequence listing (specify):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (specify):
  - ☐ any table(s) related to sequence listing (specify):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-3,8
	No: Claims	4-7,9
Inventive step (IS)	Yes: Claims	1-3,8
	No: Claims	4-7,9
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

see separate sheet

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

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**Re Item V.**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1) The applicant, with his letter of reply dated 19.5.2005, argues that the independent apparatus 4 is novel over D1 and D2, because although both documents disclose a reaction vessel having an inlet and an outlet adapted to withstand high temperature and pressure, a microwave heating source for heating the reaction mixture and a valve, a tubing and an expansion vessel, said apparatuses are not suitable for performing adiabatic cooling of the reaction system.

More specifically, the apparatus of D1 is not suitable for adiabatic cooling of the reaction mixture, because the chamber 52 (used to rapidly cool the contents of the reaction vessel by expansion) is in communication with the surroundings through exhaust conduit 62 and output end 56, thus the cooling is not adiabatic.

Therefore, novelty of the subject-matter of claim 4 can be acknowledged over D1.

In respect to the apparatus of D2, the applicant says that it is not suitable for adiabatic cooling of the reaction mixture, because the two three-way valves "select the connection line to be open either through the shunt 43C or through the coil 28C... The pressure in the expansion vessel will in either case be identical with the pressure in the reaction chamber. This means that the expansion vessel cannot be used for adiabatic cooling".

However, no matter how the three-way valves are used in D2, they enable also the selection of cycling the reaction mixture through the shunt 43C and the coil 28C, thus they enable different pressures to be established in the reaction vessel 2C and the expansion chamber 16C. Thus, the apparatus of D2 is suitable for adiabatic cooling of the reaction mixture.

Therefore, the subject-matter of claims 4-7 and 9 is still not considered to be novel over D2 (Art.33(2)PCT).

2) The present application meets the criteria of Article 33(1) PCT, because the subject-matter of claims 1-3, and 8 is novel and involves an inventive step in the sense of Article 33(2) and Art. 33(3) PCT.

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D3 is considered as the closest prior art in regard to claim 1. D3 discloses an apparatus for performing chemical reactions, like organic synthesis reactions (see page 21, lines 1-25) using microwave heating. D3 discloses means for controlling accurately the process parameters, like the temperature. The method for performing chemical reactions according to D3 discloses supplying substances into a reaction vessel adapted to withstand high temperature and pressure (see page 16, lines 23-31 and page 17, lines 7-13), applying microwave heating, rapid cooling the reaction mixture (see page 17, lines 15-35) by use of a device of any sort. The need of a rapid cooling for avoiding undesired side reactions is already mentioned in D3 on page 17. The cooling by adiabatic cooling is not mentioned among the several alternatives for rapid cooling mentioned in D3.

The difference between D3 and claim 1 is seen in that D3 does not disclose an adiabatic cooling step.

The subject-matter of claim 1 is therefore considered to be novel.

The problem solved by the above mentioned difference is seen in providing a uniform cooling of the reaction mixture, thereby avoiding temperature gradients. Although rapid cooling of the reactor contents, by expansion is already known as a cooling method from D1, in D1 such cooling is not done adiabatically. D3 neither suggests the use of adiabatic cooling, nor would the person skilled in the art arrive to the method of claim 1 by combining the disclosures of D3 and D1, because the cooling used in D1 is not adiabatic.

Therefore, the subject-matter of claim 1 is considered to involve an inventive step (Art.33(3) PCT).

3) The dependent claims 2,3 and 8 meet the requirements of the PCT with respect to novelty and inventive step.